

ACTUALITIES IN DIAGNOSIS OF FOOD ALLERGY DERMATITIS (FAD)

S. MORARIU, GH. DĂRĂBUȘ, I. OPRESCU, NARCISA MEDERLE, M.S. ILIE, CECILIA DĂBOVEANU

Faculty of Veterinary Medicine Timisoara
300645, Calea Aradului No. 119, Timisoara, Romania
E-mail: sorin.morariu@fmvt.ro

Summary

It is known that any food has the potential to induce adverse reactions, but only few ingredients are susceptible. The factors from a diet play an important role in the maintenance of healthy coat and skin, but also they are relevant both in the etiology and therapy of certain skin diseases. The diagnosis of food allergy dermatitis is not always facile. This paper briefly describes the possibilities to establish an accurate diagnosis.

Key words: food allergy dermatitis, diagnosis, actualities.

Food allergy is a hypersensitivity reaction to normally harmless substances and involves immune responses, both humoral (IgE) and cell mediated (T lymphocytes) responses.

The most common form of skin sensitization to food components is mediated by IgE antibodies and reflects an immediate-type ("Type I hypersensitivity") reaction. During this process specific IgE antibodies are directed against food allergens. After re-exposure to the incriminated food allergen(s), the preformed mediators (histamine, tumor necrosis factor etc.) will be released, causing the acute phase of the allergic reaction. Therewith, the newly synthesized mediators (leukotrienes, prostaglandins, and cytokines), will lead to the recruitment of inflammatory cells causing the late-phase responses. Also, the allergens may activate special subsets of T lymphocytes which cause IgE-independent inflammatory ("delayed-type-hypersensitivity") reactions like atopic eczema (1, 6, 7, 30).

Clinical signs occur in few minutes to 1-2 hours after ingestion of the suspected allergic food. These signs could be both gastrointestinal and dermatological ones. For the first vomiting, flatulence, and diarrhea are reported and for the second, mainly pruritus, urticaria, and angioedema are described (12, 14, 16, 28).

It is considered that about 1% of all dogs and cats are affected by this type of allergic reaction involving the skin, gastrointestinal tract, respiratory tract and central nervous system. In dogs, the incidence of food allergy dermatitis is estimated at 1–5% of all skin conditions and up to 23% of cases of nonseasonal allergic dermatitis (8, 30, 34), while in cats has been estimated to be 5.8% of chronic dermatological abnormalities and the second most common cause of allergic dermatitis in cats being responsible for up to 11% of cats with miliary dermatitis (8, 12, 37).

Patterns of adverse reactions to food are diverse including dietary indiscretion and food aversion as well as food allergy and intolerance (Fig. 1).

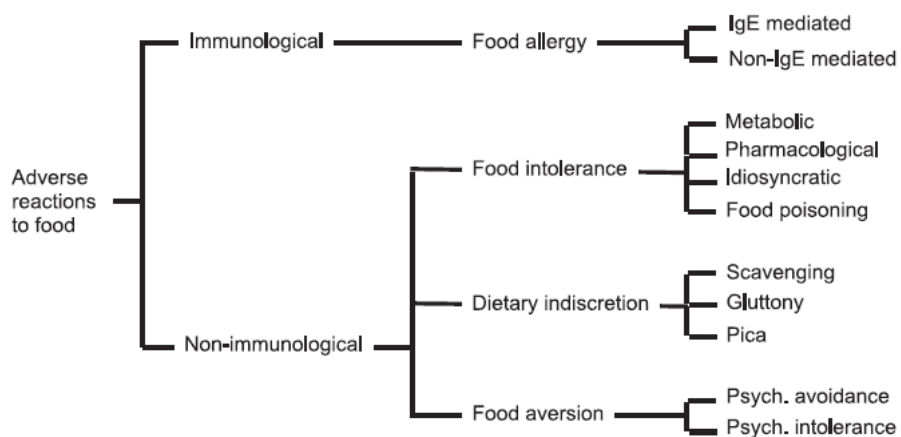


Figure 1. The patterns of adverse reactions to food (after Lloyd, 2006)

Diagnosis

The diagnosis of food allergy has two objectives: 1) to establish a causal relationship between food ingestion and the clinical symptoms of the patient reported by the owner and 2) to identify the immune mechanism of the reaction. So, a diagnosis schedule should include a detailed clinical history and physical examination, diagnostic tests for IgE, elimination diets, and oral food challenges.

Clinical history and physical examination

The clinical history involves a meticulous description of the adverse food incident in order to exactly determine its clinical features and it should provide enough information.

Specific questions should be asked about the food suspected of provoking the reaction, the amount and the food processing procedure, as they are designed in the examination sheet. Also, questions on gastrointestinal, skin and airway symptoms are needed.

Moreover, the history may ask questions about the timing of the reaction dealing with food ingestion, the minimum quantity of food necessary to cause symptoms, a family history positive for allergy.

In some cases, diet diaries proved to be useful. Their success depends on the correct identification of the allergen and its complete elimination from the diet.

The physical examination is compulsory. Findings have to assess' growth parameters, signs of allergic disease and other conditions that may mimic food allergy (9, 14). Pruritus should always raise suspicion of FAD, mainly with concurrent gastrointestinal signs and/or perineal area transformations (26).

Diagnostic tests for IgE

Skin testing and in vitro tests seems to be useful in establishing if the dog or cat has IgE antibodies to a specific component of food if an IgE-mediated allergic reaction to food is suspected.

These tests reveal the presence of an immune IgE-mediated response, but they could not certainly establish the diagnosis of FAD. In humans, some studies using the double-blind, placebo-controlled, food challenges to establish the diagnosis of clinical allergy indicated that only 40% of medical histories of FAD can be verified (3, 5, 33).

Specific serum IgE titer is measured using enzyme-linked immunosorbent assay (ELISA), but the specificity of the response could not be predicted.

A new finding is that of the effect of gender and age on both the total and allergen-specific IgE responses to oral allergen challenge, and the clinical skin response. It was observed that the male dogs had a greater clinical cutaneous response and specific / total IgE serological response when compared with intact or neutered females. Also, an increase in total and specific IgE responses with increasing age was encountered (22).

There is a commercial available assay, especially for cats, for IgE antigen-specific from serum (14), but this kind of evaluation seems to be not so reliable in the diagnosis of FAD, it has a large variability in humans and is disappointed in dogs (19, 25, 32, 35).

Skin testing

Percutaneous skin testing remains a primary tool in the diagnosis of food allergy, despite the fact that it has a controversial value in the diagnosis of food allergy (17).

In humans, skin prick testing is 100% relevant for cow milk, peanuts and eggs (9, 20), but in dogs, these tests are not recommended, because some of them could have positive reactions to house dust mite antigens, which are ubiquitous, or cross-reactivity with other insects (29). On the other hand, atopic dogs are more susceptible to react when food allergens are intradermal delivered (21).

Oral food challenges

It is reasonable to presume that the patient should be placed on an at least 2 weeks elimination diet of the incriminated food before starting any challenges.

1. Food elimination diet

If in humans the “gold standard” in diagnosing FAD is the DBPCFC (double-blind, placebo-controlled, food challenge), when capsules of food allergens are ingested by the patient and the results are evaluated after, in canine FAD the diagnosis is based on an elimination test diet (24, 36).

The majority of pets are fed a commercially available food entirely or at least for a part of their diet. This means that identification of the potential allergens is almost impossible. Using a specific diet or a home cooking one may be appropriate or not (18).

During the elimination diet no other ingredients, excepting prescribed ones, should be offered. These include also drugs which contain flavored or colorant agents in their composition. The diet should be fed for 6 to 10 weeks to see a positive response, but the change to the new diet has to be made over a 3 to 5 days period to avoid gastrointestinal disturbances (21, 35).

To establish a diet, a selection criterion should be ruled: a) the diet should be acceptable both to the pet and owner, b) the price should be reasonable, c) the pet should have received previously a small amount or none of these ingredients (21).

The diet should be restricted to one carbohydrate and one protein source (50:50) to which the pet had a limited or no access. The maximum time for improvements is about 13 weeks. Important improvement will be seen only after 4 weeks trial if the animal is sensitive to some food components (10).

One of the most difficult challenges is the owner compliance. It has to choose between a novel protein diet, a hydrolysate diet (more expensive) and a home cooked one (21, 23, 39), but it is a tough challenge because most animals have eaten commercial diets containing a large scale of ingredients from protein and carbohydrate sources.

The hydrolyzed diets contain broken proteins into small peptides and free amino acids which are not capable to activate the immune system. Also, they can be successfully used in the inflammatory bowel disease in dogs (27).

Probably, the home cooked elimination diet should be considered the “gold standard” for diagnostic purposes (24).

2. Challenge and provocation diet trials

It can be used only if there are improvements after elimination diet. The challenge means to feed the cat or dog with the original diet. If the clinical signs return it is confirmed that one or several components of the diet caused the signs. This challenging period last until the signs come back, but has to be no longer than 10 days (10).

The provocation diet trial is ruled if the challenge confirms FAD. A single ingredient has to be added to the elimination diet from a large range of meats (pork, beef, lamb, fish, chicken, duck, rabbit, ostrich, alligator, wild game etc), a

wide range of grains (wheat, corn, rice, soybean, barley), carrots, potatoes, eggs and dairy products. For each ingredient the provocation interval last till the clinical signs are developed or up to 10 days. After that, commercial available diets which not contain the harmful ingredients could be selected (18, 24; 29).

There are several manufacturers which can provide commercial hypoallergenic diets: Hill's, Royal Canin, Iams (Eukanuba), Purina etc., both canned and dry.

Histopathological findings

The histopathological findings are variable. Some of them could be suggestive for FAD, but usually they are nondiagnostic. It can be observed: lymphocytic-plasmacytic colitis, rectal eosinophilia, congestion, edema, villous degeneration, hemorrhage and a large number of plasma cells in the wall of small intestine, but also congestion and edema in the stomach (11, 12, 31, 38). Besides, superficial perivascular dermatitis with predominance of neutrophils and mononuclear cells has been noticed. Much more, eosinophils could be more numerous than in atopy (29). But skin biopsies are generally nonspecific for FAD diagnosis (18, 21).

Gastroscopic and colonoscopic food sensitivity testing

This kind of diagnosing assay is rather experimentally in animals, but it has been proved efficient in humans. The allergens are injected directly into the mucosa of the colon and results are observed as wheal and flare reactions (4). In atopic dogs this procedure had a good reproducibility and it had 75% sensitivity and 73% specificity (2). A similar technique was also described for the gastric mucosa using an endoscope (15, 24).

Actually, in most cases, these methods are not a practical option.

Differential diagnosis

This includes: other hypersensitivities, external parasites, bacterial folliculitis, dermatophytosis, *Demodex* infestation, *Malassezia* dermatitis, drug reactions (10, 29).

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